TABLE 4.—*Mean altitudes and temperatures of significant points identifiable as tropopauses during June 1939, classified according to the potential temperatures (10-degree intervals between 310° and 409° A.) with which they are indentified (based on radiosonde observations)*

Potential temperatures	Fargo, N. Dak.			Nashville, Tenn.			Oakland, Calif.			Oklahoma City, Okla.			Omaha, Nebr.			Sault Ste. Marie, Mich.			St. Georges, Bermuda			Washington, D. C		
	Number of cases	Mean altitude (km.) m.s.l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m.s.l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m.s.l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m.s.l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m.s.l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m.s.l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m.s.l.	Mean temperature °C.	Number of cases	Mean altitude (km.) m.s.l.	Mean temperature °C.
310–319	3	8.9	−48.7				1	7.4	−35.0							4	8.9	−46.5						
320–329	13	10.3	−52.0				3	9.1	−39.7				1	8.7	−32.0	8	9.3	−43.0	1	11.1	−56.0	1	8.7	−32.0
330–339	13	12.7	−55.5	4	11.3	−51.5	12	10.6	−46.3	7	11.8	−56.7	10	10.4	−45.4	12	10.7	−50.3	11	12.7	−56.9	7	11.1	−50.6
340–349	9	12.3	−58.4	24	12.3	−54.4	21	12.3	−56.1	14	12.0	−53.6	15	12.3	−55.2	15	12.0	−55.3	16	12.9	−62.2	9	12.8	−63.1
350–359	3	13.8	−67.7	17	13.5	−61.0	15	13.5	−63.0	15	13.6	−63.1	10	13.2	−59.8	12	13.0	−58.8	13	13.9	−65.9	11	13.5	−62.6
360–369				10	14.5	−64.6	4	13.5	−55.8	8	15.0	−69.9	8	14.0	−58.9	2	13.6	−59.5	6	14.9	−69.3	4	14.4	−63.8
370–379				7	15.0	−64.3	4	14.5	−59.8	8	14.9	−63.8	5	14.5	−62.4	2	13.6	−53.5	5	17.7	−71.6	2	14.8	−63.0
380–389	1	13.9	−52.0	4	15.6	−67.2	4	15.5	−64.2	4	15.9	−67.0	5	15.5	−64.0	2	15.6	−65.5	1	16.0	−70.0			
390–399				6	16.5	−68.2	5	16.0	−65.0	3	16.1	−65.3	4	16.5	−67.8	2	15.4	−60.5	2	16.4	−69.0	3	16.5	−68.7
400–409				1	16.6	−62.0							1	17.1	−68.0							1	16.0	−65.0
All (weighted means)		11.7	−55.3		13.6	−60.1		12.7	−56.2		13.6	−61.5		13.1	−56.8		11.7	−53.3		13.9	−63.9		13.2	−60.4
Mean potential temperature	334.5			354.8			347.8			352.7			350.9			332.4			366.5			354.8		

RIVERS AND FLOODS

[River and Flood Division, MERRILL BERNARD in charge]

The report for June will be published in the July REVIEW.—*Editor.*

WEATHER ON THE ATLANTIC AND PACIFIC OCEANS

[The Marine Division, I. R. TANNEHILL in Charge]

NORTH ATLANTIC OCEAN, JUNE 1939

By H. C. HUNTER

Atmospheric pressure.—Pressure during June averaged practically normal near the West Indies and the eastern coast of North America, but lower than normal over the central and northwestern portions of the North Atlantic, Bermuda having a deficiency of 0.06 inch. The southeastern portion showed a small excess, and the northeastern a large one, the average of Lerwick, Shetland Islands, being 0.15 inch greater than normal. However, over most of the eastern North Atlantic there was not so great an excess of pressure as during the preceding month.

Over the higher latitudes fluctuations of pressure were both rapid and wide for the time of year.

The extremes of pressure noted in available vessel reports were 30.70 and 29.38 inches. The high mark was recorded during the forenoon of the 21st, on an unidentified vessel near 55° N., 23° W. The low mark was noted within a very few miles of Cape Race, Newfoundland, early on the 1st, by the British liner *Caledonia.*

Table 1 shows that two far northern stations had lower pressure on the 14th than the *Caledonia's* extreme low, while on the 1st the Belle Isle station recorded a pressure of 28.64 inches.

Cyclones and gales.—There were about as many reports of gales along and near the chief routes to northwestern Europe as usual during June. There were several reports of strong gales (force 9), but none of winds of any greater energy. The northwestern portion of the much-traversed area furnished some strong-gale reports for the first week. The morning of the 1st found an intense LOW, which had come from the interior of Canada on an easterly course, centered near the northern tip of Newfoundland; thence it turned toward the north-northeast, so that its influence on transatlantic vessels did not last long. Later cyclones of somewhat less energy caused gales soon afterward in the vicinity of the Grand Banks.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Atlantic Ocean and its shores, June 1939.*

Station	Average pressure	Departure	Highest	Date	Lowest	Date
	Inches	*Inch*	*Inches*		*Inches*	
Julianehaab, Greenland	29.82	−0.04	30.52	23	29.20	14
Reykjavik, Iceland	29.95	+.07	30.71	21	29.26	14
Lerwick, Shetland Islands	29.95	+.15	30.51	1	29.38	28
Valencia, Ireland	30.03	+.03	30.42	9	29.50	28
Lisbon, Portugal	30.06	+.03	30.37	9	29.89	12
Madeira	[1] 30.09	+.02	30.21	7	29.94	25
Horta, Azores	30.20	−.04	30.37	7	29.86	26
Belle Isle, Newfoundland	29.86	.00	30.36	26	28.64	1
Halifax, Nova Scotia	29.98	+.01	30.28	3	29.56	6
Nantucket	29.99	+.01	30.30	3	29.70	6
Hatteras	30.01	.00	30.21	27	29.82	23
Bermuda	30.07	−.06	30.28	13	29.86	23
Turks Island	30.04	+.01	30.12	16	29.91	23
Key West	30.00	+.01	30.14	16	29.85	14
New Orleans	29.98	.00	30.19	21	29.77	14

[1] For 23 days.

NOTE.—All data based on a. m. observations only, with departures compiled from best available normals related to time of observation, except Hatteras, Key West, Nantucket, and New Orleans, which are 24-hour corrected means.

Near the fortieth parallel of latitude, about the 17th to 19th, rather stormy conditions prevailed between longitudes 65° and 35°, where such rough weather is seldom met during the early summer. A LOW of moderate energy, which had come from the Lake region, was central near northeastern Newfoundland on the 17th, with a trough extending far to the southward and southwestward, and this and the moderately high pressure in lower latitudes at the same time were the chief factors in causing the strong winds.

Tropical disturbance.—Elsewhere in this issue of the REVIEW is found an account of the disturbance which affected western Caribbean waters and the central and eastern parts of the Gulf of Mexico about the 12th to 16th. This LOW took in general a northward course and was never of great intensity.

Chart XIII shows the conditions of the 13th, and indicates the path of the center of this disturbance.

Fog.—There was not so much fog as during the preceding May over waters close to the British Isles and France; but from Delaware Bay to the eastern limits of the Grand Banks there was substantially as much as in May, and a decided increase was noted farther northeastward between 45° and 55° N., 20° and 35° W. This last-named region, however, had scarcely any fog close to the middle of the month or during the final week.

The region of the Grand Banks experienced little fog before the 9th, and the waters near the Maritime Provinces and New England had compartaively little during the first 8 days of the month or after the 22d.

There was somewhat less fog than usual during June over waters to southward of Nova Scotia and western Newfoundland, and generally near the 45th parallel from the 30th meridian to the European continent. On the other hand there was more than usual near 50° N., 35° W. As a rule the waters close to the northeastern coast of the United States, and the waters southeast and east of Newfoundland had about as much fog as usual in June.

There were two well-separated 5° squares with 14 days of fog each, the greatest number tabulated from available reports. One was the square from 40° to 45° N., 65° to 70° W., the other from 40° to 45° N., 50° to 55° W.

Two considerable mishaps resulted from fog over Atlantic waters. The British Steamship *Penolver* grounded on the 12th, while approaching Louisburg, Nova Scotia. The vessel was soon freed, but had to be largely unloaded and then docked for repairs. Off Plymouth, England, two vessels collided, probably on the 22d, with much damage to each, but both vessels made port promptly.

OCEAN GALES AND STORMS, JUNE 1939

Vessel	Voyage		Position at time of lowest barometer		Gale began June	Time of lowest barometer, June	Gale ended June	Lowest barometer	Direction of wind when gale began	Direction and force of wind at time of lowest barometer	Direction of wind when gale ended	Direction and highest force of wind	Shifts of wind near time of lowest barometer
	From—	To—	Latitude	Longitude									
NORTH ATLANTIC OCEAN			° ′	° ′				*Inches*					
Leto, Du. S. S.	Rotterdam	Wabana	49 42 N.	39 54 W.	2	Noon, 2	3	29.57	S.	SW, 9	W.	SW, 9	SW-WSW.
Aztec, Am. M. S.	Tuxpam	Houston	24 30 N.	95 40 W.	3	4a, 3	3	29.87	SE.	SE, 5	NW.	NW, 8	SE-W-NW.
Chelan, U. S. Coast Guard	On ice patrol out from Halfax.		41 41 N.	53 03 W.	5	3a, 6	5	29.81	SW.	NW, 5	S.	SW, 9	WNW-N.
Do	do		[1]41 15 N.	52 07 W.	7	3p, 6	8	29.84	SE.	W, 3	SE.	S, 8	W-SW.
Black Condor, Am. S. S.	Antwerp	New York	41 10 N.	57 52 W.	5	2a, 7	7	29.59	SSW.	SW, 6	N.	SSW, 8	SW-NW.
Columbus, Ger. S. S.	Cobh	do	40 42 N.	54 12 W.	7	8a, 7	7	29.63		SE, 8		SE, 8	
Bockenheim, Ger. S. S.	Fredrikshaven	Boston	58 39 N.	15 55 W.	8	Noon, 9	10	29.80	SW.	W, 9	W.	W, 9	SW-W.
Executive, Am. S. S.	Gibraltar	New York	36 36 N.	60 15 W.	9	1a, 10	10	29.84	SW.	SW, 8	SW.	SW, 8	SW-NNE.
Hibueras, Am. S. S.	New Orleans	Porto Castilla	21 48 N.	87 00 W.	12	4p, 12	12	29.72		ENE, 6		ENE, 6	ENE-SE.
Oropesa, Br. S. S.	Havana	Cristobal	22 20 N.	84 45 W.	12	2a, 13	13	29.49	S.	S, 7	SSE.	SSW, 8	S-SSW.
Carrillo, Am. S. S.	Barrios	Charleston	23 00 N.	84 12 W.	12	7a, 13	13	29.69	E.	E, 7	SSE.	SE, 8	E-SE.
Alabama, Am. S. S.	Houston	San Juan	24 54 N.	85 06 W.	12	3p, 13	14	29.77	E.	SE, 8	S.	SE, 9	ESE-S.
Orotava, Hond. S. S.	Tela	New Orleans	26 00 N.	88 00 W.	13	4p, 13	13	29.67		NNE, 8		NNE, 8	
Bockenheim, Ger. S. S.	Fredrikshaven	Boston	[1]51 31 N.	34 03 W.	13	7p, 13	13	29.69	SSW.	SW, 9	WSW.	SW, 9	SSW-WSW.
Kofresi, Am. S. S.	Tampa	Mobile	29 30 66.	87 36 W.	13	6p, 14	14	29.54	S.	NE, 8	NNE.	ENE, 8	ENE-N.
Gulfking, Am. S. S.	Portland, Maine.	Port Arthur	26 22 N.	86 15 W.	13	4a, 15	15	29.75	SE.	SW, 5	SW.	SW, 8	None.
Frode, Dan. S. S.	Aolborg	New York	57 35 N.	20 40 W.	15	11a, 15	15	29.41	W.	WSW, 5	W.	W, 8	
West Madaket, Am. S. S.	Mobile	London	48 30 N.	18 00 W.	16	4a, 17	18	29.76	W.	SW, 8	NNW.	SW, 8	
Tuscaloosa City, Am. S. S.	Avonmouth	Baltimore	50 48 N.	17 24 W.	16	5a, 17	17	29.50	W.	WSW, 8	W.	WSW, 8	SW-WSW.
Chelan, U. S. Coast Guard.	On ice patrol out from Halfax.		41 36 N.	49 00 W.	17	1p, 17	17	29.74	SSW.	W, 7	W.	SSW, 9	SSW-W.
Excello, Am. S. S.	New York	Casablanca	40 00 N.	63 24 W.	18	8p, 17	18	29.84	NNW.	NNE, 4	NNW.	NNW, 8	E-NNE.
Spaarndam, Du. S. S.	Antwerp	New Orleans	36 24 N.	53 54 W.	18	7a, 18	18	29.69		SW, 8	SW.	SW, 8	W-SW-NW.
Schoharie, Am. S. S.	Bremen	Jacksonville	40 26 N.	38 13W.	19	9a, 19	19	29.88		S, 8		S, 8	
Frode, Dan. S. S.	Aalborg	New York	49 49 N.	39 05 W.	19	4p, 19	19	29.48	S.	SW, 8	SW.	SW, 8	None.
Exiria, Am. S. S.	Gibraltar	do	40 06 N.	41 36 W.	23	2p, 23	23	29.69	SSW.	SW, 8	W.	SW, 8	SSW-WSW.
NORTH PACIFIC OCEAN													
Gefion, Nor. M. S.	Yokohama	Estero Bay	43 35 N.	172 24 W.	1	4p, 1	1	29.06	ESE.	SE, 8	SE.	SE, 8	ESE-SW.
Jefferson Myers, Am. S. S.	Dairen	Portland, Oreg.	48 30 N.	173 00 W.	1	11p, 1	2	29.08	E.	E, 10	SE.	E, 10	E-ESE.
Manoa, Am. S. S.	Mahukona	San Francisco	37 18 N.	123 24 W.	1	4a, 2	2	29.96	N.	NW, 7	NW.	NNW, 8	
Toho Maru, Jap. M. S.	Genzan	Los Angeles	45 04 N.	179 57 E.	2	Mdt, 2	2	28.53	SW.	WNW, 6	S.	SW, 8	NW-SW.
Empress of Russia, Br. S. S.	Victoria, B. C.	Yokohama	50 00 N.	176 00 E.	2	4a, 3	3	29.25	NE.	NNE, 11	N.	NNE, 11	NE-N.
Kaijo Maru, Jap. M. S.	San Francisco	Niigata	49 56 N.	174 00 E.	2	3a, 3	4	29.33	NE.	NNE, 8	NNW.	N, 9	N-NNE-N.
Republic, U. S. A. T.	Balboa	San Francisco	15 18 N.	98 00 W.	12	5a, 13	13	29.63	E.	E, 8	E.	E, 8	
Occidental, Am. S. S.	do	Los Angeles	15 00 N.	96 40 W.	13	2p, 13	13	29.34	E.	NNW, 10	W.	NW, 10	E-NW.
Pres. Monroe, Am. S. S.	do	do	14 49 N.	96 55W.	13	2p, 13	13	29.10	S.	SSE, 6	WNW.	NW, 12	SSE-N-NW.
Philadelphia, U. S. N.	do	do	15 03 N.	98 34 W.	13	8a, 13	13	29.44	E.	NE, 9	WNW.	N, 12	ENE-N.
Dickenson, Am. S. S.	Honolulu	Midway	27 12 N.	173 36 W.	14	6a, 14	14	29.77		S, 9		S, 9	SSE-SW.
Niel Maersk, Dan. M. S.	Yokohama	Los Angeles	45 58 N.	174 41 W.	14	Noon, 15	15	29.59	NNE.	ENE, 3	NE.	NNE, 9	NE-E.
Lewis Luckenbach, Am. S. S.	Balboa	do	17 18 N.	101 36 W.	27	5a, 28	28	29.72	E.	ESE, 7		E, 8	E-ESE.

[1] Position approximate.

NORTH PACIFIC OCEAN, JUNE 1939

By WILLIS E. HURD

Atmospheric pressure.—For the most part the average pressure distribution on the North Pacific Ocean in June 1939 was close to normal. The only radical departure noted was at Petropavlovsk, where the average of 30.01 inches was 0.15 above the normal. The Aleutian LOW was slightly deeper than in the preceding month, owing to the greater and unusual prevalence of cyclones over the central islands of the group, especially during the first and last parts of June. At Dutch Harbor the average pressure was 29.89, as compared with 29.94 in May. High pressure was central over the eastern part of the ocean in middle latitudes. The usual summer LOW prevailed off the China coast.